DOCUMENT RESUME

ED 037 151 HE 001 303

AUTHOR Secrest, Leigh
TITLE The Rationale for Polydisciplinary Programs.
INSTITUTION Council of Graduate Schools in the U.S., Washington, D.C.
PUB DATE Dec 69
NOTE 7p.; Address to the Ninth Annual Meeting of the Council of Graduate Schools in the U.S., Washington, D.C. December 4-6, 1969

EDRS PRICE EDRS Price MF-$0.25 HC-$0.45
DESCRIPTORS *Graduate Study, *Higher Education, *Interdisciplinary Approach, *Relevance (Education), *Teaching

ABSTRACT

The academic disciplines are strengthened by dynamic interaction with each other. The polydisciplinary effort should be accepted as a viable means of intellectual progress. Polydisciplinary research should be accompanied by polydisciplinary learning and the faculty should pool their talents and ideas in the classroom as well as in the research laboratory. (JS)

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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THE RATIONALE FOR POLYDISCIPLINARY PROGRAMS

Leigh Secrest, Texas Christian University

My colleague, Dean Alpert, has contributed significantly to a better understanding of those centers and programs representing more than one of our conventional contemporary disciplines. The definitions given are helpful as we try to focus better on their understanding. However, he has posed a problem for me, since I wish to concentrate on what I think is a unifying hypothesis of rationale for all such efforts. Hence, I need a term to designate the universal set of all programs, laboratories, centers, etc., which involve at any one time the techniques and content of more than one conventional discipline. Just to be different and to counter any dangerous trend toward fewer labels I have chosen to call members of this universal set polydisciplinary efforts.

As an aside I should mention that all of this play on words is artificial and smacks somewhat of rhetorical justification for our behavior as Parkensonian bureaucrats. In trying to organize my thoughts for this presentation I found the task more and more difficult with the passage of time, primarily because I am uncertain as to what constitutes a basic discipline. It would seem that an understanding of that label is prerequisite to understanding the meaning of the several prefixes which have been suggested. We could well fall back on a paraphrasing of the statement from Alice and say that, "The word discipline shall mean precisely what I want it to mean, no more and no less." Or, we

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might take the experimental scientist's approach with an operational definition and identify disciplines with the academic departments currently in vogue. Or, we might take the view of the humanist and resist any attempt to fragment by definition the totality of man's knowledge. The dictionary definition of a discipline as "a subject or field of study" is no help at all. So let's go back to Alice. I shall take a discipline to be whatever we want it to be. In this way we can still talk about biochemistry as being polydisciplinary even though many of us have academic departments of biochemistry on our campuses.

Having side-stepped this semantic problem, let me suggest another one. In a recent address at Rice University, Dr. Charles Garside, Jr., associate professor of history, advanced the thesis that behind virtually all of the ferment on our campuses today lies hidden somewhere the struggle between the German and Socratic traditions of education--specialization versus generalization and unity. In some respects the tension between departments and polydisciplinary units reflects this same sort of struggle. On the one hand, the department tends to maintain the faith and methods "once delivered," while the polydisciplinary unit strives for relevance to problems of the real world.

I would like to suggest that this represents, not an either-or struggle, but rather a progression--that there is an evolutionary

"inevitability" if you will, in the emergence of the present polydisciplinary approach.

Dean Alpert mentioned three different types of polydisciplinary efforts--cross-disciplinary, interdisciplinary, and multidisciplinary. Let us consider the evolutionary processes of three fields exemplifying these categories.

We begin with biochemistry, variously called biological chemistry, physiological chemistry, and chemical biology. According to the 1964 Encyclopedia Britannica, the first institute for physiological chemistry was established at Strasbourg in 1872 under the direction of Ernst Felix Hoppe-Seyler. Training in physiological chemistry became available in the United States at Yale's Sheffield School of Science in 1880. The origins of biochemistry can be traced back to the very early days of organized knowledge, but it not become unified until men such as Liebig and Pasteur brought their insight and genius to bear on the problem of understanding the processes of living systems.

Liebig's efforts to correlate his concept of the great chemical cycles of nature with the observed behavior of plants laid the groundwork for the development of agricultural chemistry, especially chemical fertilizers. The story of Pasteur's work in fermentation is a fascinating tale of the interplay between basic research and the problems of the

fermentation industry of France.

The first nuclear or atomic reactors were designed by interdisciplinary teams of individuals drawn from many different science and engineering specialties. Both new facilities and patterns of administration were required first to meet the challenge of realizing chain reactions and later to harness the phenomenon for power applications. Pieces of a solution could have been, and were, furnished by the disciplines of the time, but no one discipline could provide all the necessary methods and answers. The polydisciplinary approach was made necessary by the challenge of a problem of the real world. Those early efforts evolved into a continuing field of study, nuclear engineering. The academic bureaucracy had acknowledged its permanence by recognizing departments of nuclear engineering. Again this new discipline has its roots in a continuing, important need of humanity--energy.

International affairs, especially the needs made evident by World War II, were credited by Gus Arlt in a 1965 paper for bringing about the establishment of Area Studies as an important and enduring field of graduate research and education. But even these programs are not "new." George Kennan points out in his Memoirs that in 1929 he did post-baccalaureate work at the Oriental Seminary of the University of Berlin. That institute was established originally by Bismarck for training young German diplomats, but by 1929 it had become a general

center for what today would probably be called area studies for non-Western cultures. Area studies constitute a visible recognition that events and societies of the real world do not fall into the neat compartments of sociology, language, economics, politics, etc. We should also take cognizance of the fact that, in the words of Gus Arlt, "a wartime exigency achieved what years of peaceful discussion in faculty meetings had not done. It proved that sacrosanct departmental lines could be crossed without destroying the integrity of the disciplines and that reasonable breadth and depth were not necessarily incompatible."

The interdisciplinary approach, of course, has been expounded for the past 20 years by another "war baby"--the organized research unit, which has served as a viable link for the application of academic expertise to the problems of federal agencies. Since governments, individuals, and foundations tend to set funding patterns according to some external set of priorities, allocation of scarce resources frequently--possibly unfortunately--supplies the motivating "nudge" for forming problem-oriented institutes. One can argue rather cogently that it is precisely this mechanism that breeched the ivory tower. However, at least in theory, these problems were delegated by society to the university via the funding agency. Whether you consider this a benefit of polydisciplinary activities depends upon your personal view of the purposes of a university.

There are those who argue persuasively that involvement of the university via mission-oriented research has led to many of the abuses and dissatisfactions which now plague our campuses. I prefer to argue from another perspective and postulate that more and better polydisciplinary effort in the humanities and social sciences, with daily interaction between federal bureaus and the campus, could have done much to revitalize or, at least, lend an aura of relevance to our curricula.

What has this to do with rationale? Simply this. The parent disciplines are strengthened, not weakened, by dynamic interaction with others. As of this date no one has proposed a better method than polydisciplinary ventures for this cross-pollination.

Despite the wide variety of polydisciplinary efforts launched in the last two decades, most have come about in response to a need or an opportunity. I suggest for your consideration the following hypothesis of rationale which seems to underlie all <u>bona fide</u> polydisciplinary efforts:

> Polydisciplinary efforts are the natural adaptive response of intellectual man to the challenge presented by problems of the real world as contrasted to the simplified models or representations in use within academe at any one point in history. Such efforts either begin as coalitions of individuals of varying skills but with at least one unifying purpose or intellectual interest, or with that rare individual who is able to master several disciplines and bring them together in a novel and unified fashion.

If this hypothesis is true, and the cases cited lend it some credence, then the polydisciplinary effort is at the cutting edge of man's intellectual evolution. It deserves our continuing attention and study.

The polydisciplinary effort should be more than a way of slipping by departmental obstructions-it should be accepted as a viable means of intellectual progress. Polydisciplinary research should be accompanied by polydisciplinary learning and teaching-cooperating faculty should pool talents and ideas in the seminar and classroom as well as in the research laboratory. In brief, it is my opinion that the intellectual rationale for polydisciplinary ventures is so compelling that we should move it from the research center to the classroom. Perhaps more graduate teaching by case study in the arts and sciences can be a natural companion for the polydisciplinary research and/or study center.